CLAIMS

What is claimed as new and desired to be protected by Letters Patent of the United States is:

1. A method for the manufacture of a *botulinum* antitoxin composition comprising:

injecting an animal with a monovalent *botulinum* toxoid and toxin to produce immunoglobulins and collecting plasma containing the immunoglobulins from the animal;

purifying the immunoglobulins from the plasma by affinity chromatography; and

digesting the purified immunoglobulins by a proteolytic enzyme to obtain a monovalent *botulinum* antitoxin composition.

- 2. The method of claim 1, wherein the animal is a horse.
- 3. The method of claim 1, further comprising combining a plurality of monovalent *botulinum* antitoxins for different *botulinum* toxins to create a polyvalent *botulinum* antitoxin composition.

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- 4. The method of claim 3, wherein the polyvalent *botulinum* antitoxin composition comprises antitoxin for seven different *botulinum* toxins.
- 5. The method of claim 4, wherein the antitoxins for serotypes A, B, C, E, and F have a potency > 4,000 International Units and the antitoxins for serotypes D and G have a potency > 500 International Units.
- 6. The method of claim 1, wherein the affinity chromatography uses immobilized Protein G.
- 7. The method of claim 3 further comprising supplementing the polyvalent *botulinum* antitoxin with *botulinum* monoclonal antibodies.
- 8. The method of claim 7, wherein the monoclonal antibodies are produced from mouse myeloma cells and equine lymphocyte hybridomas.
- 9. The method of claim 7, wherein the monoclonal antibodies are directed against *botulinum* neurotoxins selected from the group consisting of neurotoxins F and G.

- 10. The method of claim 1, wherein the animal is injected intradermally with toxoid.
- 11. The method of claim 1 further comprising injecting the animal with *botulinum* toxin after the toxoid injections and before collecting the plasma.
- 12. The method of claim 1, wherein the injected toxoid further comprises an adjuvant.
- 13. The method of claim 1, wherein the animal is injected with a first injection of toxoid and a second injection of toxoid.
- 14. The method of claim 13, wherein the first injection comprises about 2 mg of toxoid.
- 15. The method of claim 13, wherein the first injection is injected at multiple sites at about 0.1 mL per site.
- 16. The method of claim 13, wherein the first injection further comprises Complete Freund's Adjuvant.

- 17. The method of claim 13, wherein the second injection is given about 14 days after the first injection.
- 18. The method of claim 13, wherein the second injection comprises about 0.5 mg of toxoid.
- 19. The method of claim 13, wherein the second injection further comprises Incomplete Freund's Adjuvant.
- 20. The method of claim 13, wherein the second injection is injected at multiple sites at approximately 0.1 mL per site.
- 21. The method of claim 13, wherein a priming dose of toxin is injected after the second injection of toxoid.
- 22. The method of claim 1, wherein the animal is injected with purified toxin about 7 to 10 days before the plasma is collected.
- 23. The method of claim 1, wherein the animal is injected with purified toxin conjugated to Keyhole limpet hemocyanin about 7 to 10 days before the plasma is collected.

- 24. The method of claim 1, further comprising clarifying the plasma through a filter after the plasma is collected.
- 25. The method of claim 24, wherein the filter comprises pore sizes selected from the group consisting of 2.0 μ , 1.2 μ , 0.5 μ , and 0.22 μ .
- 26. The method of claim 1, wherein the affinity chromatography is performed at a pH between about pH 10 12.
- 27. The method of claim 1, wherein the affinity chromatography is performed at about pH 11.
- 28. The method of claim 1, wherein pepsin is used to digest the purified immunoglobulins.
- 29. The method of claim 1, wherein the digesting is performed at a pH between about pH 2.5 6.0.
 - 30. The method of claim 29, wherein the pH is about pH 4.5.

31. The method of claim 1, wherein the immunoglobulins are digested at a temperature of about 20-70°C.

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- 32. The method of claim 31, wherein the temperature is about 58°C.
- 33. The method of claim 1, wherein the digested immunoglobulins are concentrated to about 90-100 mg/mL protein.
- 34. The method of claim 1, wherein the digested immunoglobulins are purified on an anion exchange column.
- 35. The method of claim 1, further comprising lyophilizing the antitoxin composition.
 - 36. A *botulinum* antitoxin composition prepared by the method of claim 1.
- 37. The *botulinum* antitoxin composition of claim 36, having a pH in the range of about 6-8.
- 38. The *botulinum* antitoxin composition of claim 36, wherein the composition has a purity of at least about 95%.

39. The *botulinum* antitoxin composition of claim 36, wherein the composition has a protein concentration in the range of about 30-70 mg/ml.

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- 40. The *botulinum* antitoxin composition of claim 36, wherein the composition comprises at least about 60% F(ab')₂ and about 40% or less of Fab' or Fab.
- 41. A method for the manufacture of a heptavalent *botulinum* antitoxin composition comprising:

injecting a plurality of horses with monovalent *botulinum* toxoid mixed with an adjuvant,

injecting the horses with toxin after the injections of toxoid;

collecting from the horses plasma containing immunoglobulins and purifying the immunoglobulins from the plasma by affinity chromatography using immobilized Protein G, wherein the chromatography is performed at about pH 11;

digesting the purified immunoglobulins with pepsin at a temperature of about 58°C and a pH of about 4.5;

filtering the digested immunoglobulins to obtain a monovalent *botulinum* antitoxin;

combining the monovalent *botulinum* antitoxins from the plurality of horses to create a polyvalent composition;

supplementing the polyvalent composition with monoclonal antibodies directed against *botulinum* toxins F and G to produce a heptavalent composition; and lyophilizing the heptavalent composition.

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- 42. A method of treating an animal in need of *botulinum* antitoxin by administering an effective amount of the antitoxin produced by the method of claim 1.
 - 43. The method of claim 42 wherein the antitoxin is administered intravenously.
- 44. A method of preventing *Clostridium botulinum* poisoning comprising administering an effective amount of the antitoxin produced by the method of claim 1.
- 45. A *botulinum* antitoxin composition comprising antitoxin for *botulinum* toxins A, B, C, D, E, F, and G.
- 46. The composition of claim 45, wherein the antitoxins for *botulinum* toxins A, B, C, E, and F have a potency > 4,000 I.U. and the antitoxins for toxins D and G have a potency > 500 I.U.
- 47. The composition of claim 45, wherein the composition comprises about 95% of at least one member selected from the group consisting of F(ab')2, Fab, and Fab'.

48. The composition of claim 45, wherein the composition comprises at least about 60% F(ab')₂ and about 40% or less of Fab' or Fab.